

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Yoshiho GOTOH et al.

Serial No.: Unknown (Division of Serial No. 09/676,350)

Filing Date: Herewith

For: INFORMATION RECORDING MEDIUM AND SYSTEM CONTROLLER

Examiner: Unknown

Art Unit: 2651 (Anticipated)

Box Patent Application
Assistant Commissioner for Patents
Washington, D.C. 20231

PRELIMINARY AMENDMENT

Sir:

Entry of the following amendments prior to examination on the merits is respectfully requested.

AMENDMENTS

IN THE CLAIMS:

Please cancel original claims 1-85 without prejudice or disclaimer.

Please add new claims 86-91 as follows:

Serial No.: Unknown (Division of Serial No. 09/676,350)

86. (New) An information recording medium for appending thereon a real-time file containing real-time data to be appended in such a manner that real-time data including already-recorded real-time data and the real-time data to be appended are continuously reproducible by a playback reference model, the real-time data comprising at least one of video data and audio data,

wherein the playback reference model includes:

a pickup for reading the real-time data from the information recording medium; a buffer memory for temporarily storing the real-time data read by the pickup; and a decoder module for reading the real-time data from the buffer memory for processing,

wherein the information recording medium comprises a volume space for at least recording in sectors a file comprising data and file management information for managing the file; and the already-recorded real-time data is recorded in at least one real-time extent, each of which is allocated with logically contiguous sectors within the volume space,

wherein the real-time data to be appended is appended on the information recording medium by a method comprising the steps of:

calculating whether or not each of the at least one real-time extent will cause an overflow in an amount of data stored in the buffer memory if the already-recorded real-time data recorded in the at least one real-time extent is reproduced by the playback reference model;

correcting a calculation formula for calculating the amount of data stored in the buffer memory so that the amount of data stored in the buffer memory becomes equal to or smaller than the size of the buffer memory when it is calculated that an overflow will occur;

calculating whether or not an underflow will occur in the amount of data stored in the buffer memory if the playback reference model accesses from one of the at least one real-time extent to one of at least one newly-allocated pre-allocated area, the calculation being performed with respect to each of the at least one real-time extent, beginning from one of the at least one real-time extent which is positioned last along a

Serial No.: Unknown (Division of Serial No. 09/676,350)

reproduction direction in which the already-recorded real-time data is reproduced, and proceeding in a direction opposite to the reproduction direction;

when it is calculated that an underflow will occur, searching, among the at least one real-time extent, every real-time extent that will cause the underflow and every real-time extent that will not cause the underflow on accessing the one of the at least one pre-allocated area;

recording, in the at least one pre-allocated area, the real-time data to be appended and the already-recorded real-time data which is already recorded in said every real-time extent that will cause an underflow; and

designating as a new real-time extent said every real-time extent that will not cause an underflow in which the already-recorded real-time data is recorded and designating as a new real-time extent an area among the at least one pre-allocated area in which the real-time data to be appended and the already-recorded real-time data are recorded, and recording the file management information for managing the real-time data to be appended and the already-recorded real-time data in the volume space.

87. (New) A method for appending a real-time file containing real-time data to be appended on an information recording medium in such a manner that real-time data including already-recorded real-time data and the real-time data to be appended are continuously reproducible by a playback reference model, the real-time data comprising at least one of video data and audio data,

wherein the playback reference model includes:

a pickup for reading the real-time data from the information recording medium; a buffer memory for temporarily storing the real-time data read by the pickup; and a decoder module for reading the real-time data from the buffer memory for processing,

wherein the information recording medium comprises a volume space for at least recording in sectors a file comprising data and file management information for managing the file; and the already-recorded real-time data is recorded in at least one

Serial No.: Unknown (Division of Serial No. 09/676,350)

real-time extent, each of which is allocated with logically contiguous sectors within the volume space,

wherein the method comprises the steps of:

calculating whether or not each of the at least one real-time extent will cause an overflow in an amount of data stored in the buffer memory if the already-recorded real-time data recorded in the at least one real-time extent is reproduced by the playback reference model;

correcting a calculation formula for calculating the amount of data stored in the buffer memory so that the amount of data stored in the buffer memory becomes equal to or smaller than the size of the buffer memory when it is calculated that an overflow will occur;

calculating whether or not an underflow will occur in the amount of data stored in the buffer memory if the playback reference model accesses from one of the at least one real-time extent to one of at least one newly-allocated pre-allocated area, the calculation being performed with respect to each of the at least one real-time extent, beginning from one of the at least one real-time extent which is positioned last along a reproduction direction in which the already-recorded real-time data is reproduced, and proceeding in a direction opposite to the reproduction direction;

when it is calculated that an underflow will occur, searching, among the at least one real-time extent, every real-time extent that will cause the underflow and every real-time extent that will not cause the underflow on accessing the one of the at least one pre-allocated area;

recording, in the at least one pre-allocated area, the real-time data to be appended and the already-recorded real-time data which is already recorded in said every real-time extent that will cause an underflow; and

designating as a new real-time extent said every real-time extent that will not cause an underflow in which the already-recorded real-time data is recorded and designating as a new real-time extent an area among the at least one pre-allocated area in which the real-time data to be appended and the already-recorded real-time data are recorded, and recording the file management information for managing the

real-time data to be appended and the already-recorded real-time data in the volume space.

88. (New) An information recording apparatus for appending a real-time file containing real-time data to be appended on an information recording medium in such a manner that real-time data including already-recorded real-time data and the real-time data to be appended are continuously reproducible by a playback reference model, the real-time data comprising at least one of video data and audio data,

wherein the playback reference model includes:

a pickup for reading the real-time data from the information recording medium; a buffer memory for temporarily storing the real-time data read by the pickup; and a decoder module for reading the real-time data from the buffer memory for processing,

wherein the information recording medium comprises a volume space for at least recording in sectors a file comprising data and file management information for managing the file; and the already-recorded real-time data is recorded in at least one real-time extent, each of which is allocated with logically contiguous sectors within the volume space,

wherein the information recording apparatus comprises:

a data amount calculation section for calculating whether or not each of the at least one real-time extent will cause an overflow in an amount of data stored in the buffer memory if the already-recorded real-time data recorded in the at least one real-time extent is reproduced by the playback reference model; correcting a calculation formula for calculating the amount of data stored in the buffer memory so that the amount of data stored in the buffer memory becomes equal to or smaller than the size of the buffer memory when it is calculated that an overflow will occur; calculating whether or not an underflow will occur in the amount of data stored in the buffer memory if the playback reference model accesses from one of the at least one real-time extent to one of at least one newly-allocated pre-allocated area, the calculation being performed with respect to each of the at least one real-time extent, beginning from one of the at least one real-time extent which is positioned last along a

reproduction direction in which the already-recorded real-time data is reproduced, and proceeding in a direction opposite to the reproduction direction; and when it is calculated that an underflow will occur, searching, among the at least one real-time extent, every real-time extent that will cause the underflow and every real-time extent that will not cause the underflow on accessing the one of the at least one pre-allocated area;

a data recording section for recording, in the at least one pre-allocated area, the real-time data to be appended and the already-recorded real-time data which is already recorded in said every real-time extent that will cause an underflow; and

a file structure processing section for designating as a new real-time extent said every real-time extent that will not cause an underflow in which the already-recorded real-time data is recorded and designating as a new real-time extent an area among the at least one pre-allocated area in which the real-time data to be appended and the already-recorded real-time data are recorded, and recording the file management information for managing the real-time data to be appended and the already-recorded real-time data in the volume space.

89. (New) An information recording medium for appending thereon a real-time file containing real-time data to be appended in such a manner that real-time data including already-recorded real-time data and the real-time data to be appended are continuously reproducible by a playback reference model, the real-time data comprising video data and audio data,

wherein the playback reference model includes:

a pickup for reading the real-time data from the information recording medium; a buffer memory for temporarily storing the real-time data read by the pickup; and a decoder module for reading the real-time data from the buffer memory for processing,

wherein the information recording medium comprises a volume space for at least recording in sectors a file comprising data and file management information for managing the file; and the already-recorded real-time data is recorded in at least one

Serial No.: Unknown (Division of Serial No. 09/676,350)

real-time extent, each of which is allocated with logically contiguous sectors within the volume space, wherein:

- the real-time data is compressed in an MPEG format;
- the already-recorded data comprises first data and second data;
- the first data and the second data each include at least one GOP; and
- the second data is positioned at an end of the already-recorded real-time data, wherein the real-time data to be appended is appended on the information

recording medium by a method comprising the steps of:

- reading the second data from the at least one real-time extent;
- re-encoding the second data which has been read in such a manner that the second data which has been read and the real-time data to be appended are seamlessly reproducible;
- recording the re-encoded second data in one or more of at least one newly-allocated pre-allocated area;
- recording the real-time data to be appended in the one or more of the at least one newly-allocated pre-allocated area;
- designating as a new real-time extent an area in which the first data is recorded and designating as a new real-time extent the area in which the re-encoded second data and the real-time data to be appended are recorded, and recording the file management information for managing the first data, the re-encoded second data, and the real-time data to be appended in the volume space,

wherein the first data, the re-encoded second data, and the real-time data to be appended are recorded in N said new real-time extents (where N is an integer which is equal to or greater than 2) each of which is allocated with logically contiguous sectors within the volume space; and

an (i+1)th new real-time extent (where i is an integer which satisfies $1 \leq i < N$) among the new real-time extents is positioned at a position satisfying a real-time reproduction condition defined as:

$$B(i) = B(i-1) + D(i) - V_{out} \times T(i) \geq 0,$$

wherein:

Serial No.: Unknown (Division of Serial No. 09/676,350)

$T(i)$ represents a time required for the pickup to access from an end of an i th new real-time extent to a beginning of the $(i+1)$ th new real-time extent;

$B(i)$ represents an amount of data having been stored in the buffer memory when the pickup accesses the beginning of the $(i+1)$ th new real-time extent, assuming that $B(0) = 0$,

$D(i)$ represents an increase in the amount of data having been stored in the buffer memory responsive to the pickup reading the data from the i th new real-time extent, such that $D(i) = (V_{in} - V_{out}) \times S(i) / V_{in}$, wherein $D(i)$ is corrected at least to a value equal to or smaller than $M - B(i-1)$ when $B(i-1) + D(i) > M$, where M represents a size of the buffer memory;

V_{out} represents a data transfer rate when the data is transferred from the buffer memory to the decoder module;

V_{in} represents a data transfer rate when the data is read from each of said new real-time extents by the pickup and transferred to the buffer memory; and

$S(i)$ represents a data size of the i th new real-time extent.

90. (New) A method for appending a real-time file containing real-time data to be appended on an information recording medium in such a manner that real-time data including already-recorded real-time data and the real-time data to be appended are continuously reproducible by a playback reference model, the real-time data comprising video data and audio data,

wherein the playback reference model includes:

a pickup for reading the real-time data from the information recording medium; a buffer memory for temporarily storing the real-time data read by the pickup; and a decoder module for reading the real-time data from the buffer memory for processing,

wherein the information recording medium comprises a volume space for at least recording in sectors a file comprising data and file management information for managing the file; and the already-recorded real-time data is recorded in at least one real-time extent, each of which is allocated with logically contiguous sectors within the volume space, wherein:

Serial No.: Unknown (Division of Serial No. 09/676,350)

the real-time data is compressed in an MPEG format;

the already-recorded data comprises first data and second data;

the first data and the second data each include at least one GOP; and

the second data is positioned at an end of the already-recorded real-time data,

wherein the method comprises the steps of:

reading the second data from the at least one real-time extent;

re-encoding the second data which has been read in such a manner that the second data which has been read and the real-time data to be appended are seamlessly reproducible;

recording the re-encoded second data in one or more of at least one newly-allocated pre-allocated area;

recording the real-time data to be appended in the one or more of the at least one newly-allocated pre-allocated area;

designating as a new real-time extent an area in which the first data is recorded and designating as a new real-time extent the area in which the re-encoded second data and the real-time data to be appended are recorded, and recording the file management information for managing the first data, the re-encoded second data, and the real-time data to be appended in the volume space,

wherein the first data, the re-encoded second data, and the real-time data to be appended are recorded in N said new real-time extents (where N is an integer which is equal to or greater than 2) each of which is allocated with logically contiguous sectors within the volume space; and

an (i+1)th new real-time extent (where i is an integer which satisfies $1 \leq i < N$) among the new real-time extents is positioned at a position satisfying a real-time reproduction condition defined as:

$$B(i) = B(i-1) + D(i) - V_{out} \times T(i) \geq 0,$$

wherein:

T(i) represents a time required for the pickup to access from an end of an ith new real-time extent to a beginning of the (i+1)th new real-time extent;

Serial No.: Unknown (Division of Serial No. 09/676,350)

$B(i)$ represents an amount of data having been stored in the buffer memory when the pickup accesses the beginning of the $(i+1)$ th new real-time extent, assuming that $B(0) = 0$,

$D(i)$ represents an increase in the amount of data having been stored in the buffer memory responsive to the pickup reading the data from the i th new real-time extent, such that $D(i) = (V_{in} - V_{out}) \times S(i) / V_{in}$, wherein $D(i)$ is corrected at least to a value equal to or smaller than $M - B(i-1)$ when $B(i-1) + D(i) > M$, where M represents a size of the buffer memory;

V_{out} represents a data transfer rate when the data is transferred from the buffer memory to the decoder module;

V_{in} represents a data transfer rate when the data is read from each of said new real-time extents by the pickup and transferred to the buffer memory; and

$S(i)$ represents a data size of the i th new real-time extent.

91. (New) An information recording apparatus for appending a real-time file containing real-time data to be appended on an information recording medium in such a manner that real-time data including already-recorded real-time data and the real-time data to be appended are continuously reproducible by a playback reference model, the real-time data comprising video data and audio data,

wherein the playback reference model includes:

a pickup for reading the real-time data from the information recording medium; a buffer memory for temporarily storing the real-time data read by the pickup; and a decoder module for reading the real-time data from the buffer memory for processing,

wherein the information recording medium comprises a volume space for at least recording in sectors a file comprising data and file management information for managing the file; and the already-recorded real-time data is recorded in at least one real-time extent, each of which is allocated with logically contiguous sectors within the volume space, wherein:

the real-time data is compressed in an MPEG format;

the already-recorded data comprises first data and second data;

the first data and the second data each include at least one GOP; and
the second data is positioned at an end of the already-recorded real-time data,
wherein the information recording apparatus comprises:

an encoder for reading the second data from the at least one real-time extent; re-encoding the second data which has been read in such a manner that the second data which has been read and the real-time data to be appended are seamlessly reproducible; recording the re-encoded second data in one or more of at least one newly-allocated pre-allocated area; and recording the real-time data to be appended in the one or more of the at least one newly-allocated pre-allocated area;

a file structure processing section for designating as a new real-time extent an area in which the first data is recorded and designating as a new real-time extent the area in which the re-encoded second data and the real-time data to be appended are recorded, and creating and recording the file management information for managing the first data, the re-encoded second data, and the real-time data to be appended in the volume space,

wherein the first data, the re-encoded second data, and the real-time data to be appended are recorded in N said new real-time extents (where N is an integer which is equal to or greater than 2) each of which is allocated with logically contiguous sectors within the volume space; and

an (i+1)th new real-time extent (where i is an integer which satisfies $1 \leq i < N$) among the new real-time extents is positioned at a position satisfying a real-time reproduction condition defined as:

$$B(i) = B(i-1) + D(i) - V_{out} \times T(i) \geq 0,$$

wherein:

T(i) represents a time required for the pickup to access from an end of an ith new real-time extent to a beginning of the (i+1)th new real-time extent;

B(i) represents an amount of data having been stored in the buffer memory when the pickup accesses the beginning of the (i+1)th new real-time extent, assuming that $B(0) = 0$,

Serial No.: Unknown (Division of Serial No. 09/676,350)

$D(i)$ represents an increase in the amount of data having been stored in the buffer memory responsive to the pickup reading the data from the i th new real-time extent, such that $D(i) = (V_{in} - V_{out}) \times S(i) / V_{in}$, wherein $D(i)$ is corrected at least to a value equal to or smaller than $M - B(i-1)$ when $B(i-1) + D(i) > M$, where M represents a size of the buffer memory;

V_{out} represents a data transfer rate when the data is transferred from the buffer memory to the decoder module;

V_{in} represents a data transfer rate when the data is read from each of said new real-time extents by the pickup and transferred to the buffer memory; and

$S(i)$ represents a data size of the i th new real-time extent.

REMARKS

Claims 86-91 are now pending in the application. Favorable consideration of the application, as amended, is respectfully requested.

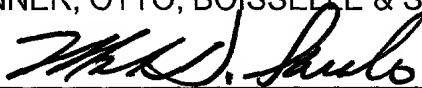
Should the Examiner feel that a telephone interview would be helpful to facilitate favorable prosecution of the above-identified application, the Examiner is invited to contact the undersigned at the telephone number provided below.

Serial No.: Unknown (Division of Serial No. 09/676,350)

Should a petition for an extension of time be necessary for the timely reply to the outstanding Office Action (or if such a petition has been made and an additional extension is necessary), petition is hereby made and the Commissioner is authorized to charge any fees (including additional claim fees) to Deposit Account No. 18-0988.

Respectfully submitted,

RENNER, OTTO, BOISSELLE & SKLAR, LLP



Mark D. Saralino

Reg. No. 34,243

DATE: June 15, 2001

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